

# *Centrodraco fidelis* (Draconettidae), a new deepwater dragonet species from the southern Loyalty Ridge, southwestern Pacific Ocean

by

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## Key words

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New species

**Abstract.** – *Centrodraco fidelis* sp. nov. is described from three specimens, which were collected on the southern Loyalty Ridge (New Caledonian EEZ) during the oceanographic cruise EXBODI. The species is characterised by: 14 rays in the second dorsal fin; 13 rays in the anal fin; first dorsal fin with the second spine elongate and filamentous in the male; second dorsal fin very low, without filaments in the male; opercular spine 1.8–2.4 in subopercular spine; body slightly compressed; body depth 7.4–8.5% of SL; body width 7.7–8.8% of SL; pectoral fin short, not reaching to anus when adpressed; pectoral fin length 9.9–11.8% of SL; male body colour pattern pale, with a single grey spot on the beginning of the lower lateral line; filament in first dorsal fin pale, fin with a large basal dark blotch; the male anal fin with three dark blotches. The new species is compared with allied species. A revised key to the genera and species of Draconettidae presented.

**Résumé.** – *Centrodraco fidelis* (Teleostei : Draconettidae), une nouvelle espèce de dragonnet profond du sud de la ride des Loyautés, océan Pacifique sud-ouest.

*Centrodraco fidelis* sp. nov. est décrite à partir de trois échantillons qui ont été pêchés dans le sud de la ride des Loyautés (ZEE de Nouvelle-Calédonie) au cours de la campagne océanographique EXBODI. L'espèce est caractérisée par : 14 rayons à la deuxième nageoire dorsale ; 13 rayons à la nageoire anale ; première nageoire dorsale possédant une deuxième épine allongée et fibreuse pour les mâles ; deuxième nageoire dorsale très basse et sans filaments pour les mâles ; épine operculaire contenue 1,8–2,4 fois dans l'épine suboperculaire ; corps légèrement comprimé, de hauteur égale à 7,4–8,5% de la longueur standard et de largeur égale à 7,7–8,8% de la longueur standard ; nageoire pectorale courte, n'arrivant pas à l'anus quand elle est alignée contre le corps ; longueur de la nageoire pectorale égale à 9,9–11,8% de la longueur standard ; coloration du corps pâle chez le mâle avec un seul point gris au début de la ligne latérale inférieure ; filament pâle à la première nageoire dorsale, cette nageoire possédant une grande tache basale sombre ; nageoire anale du mâle comportant trois taches sombres. La nouvelle espèce est comparée à des espèces voisines. Une clé actualisée des espèces et des genres de Draconettidae est présentée.

Deepwater dragonets of the family Draconettidae are a small group of benthic living fishes occurring on soft bottoms of the continental slopes and on submarine ridges and seamounts. Its species are distributed worldwide in tropical and subtropical areas, roughly between 35°N and 35°S. Most of the draconettids are considered to be extremely rare; most species are known only from a few specimens.

Draconettid fishes are characterised by an elongate, rounded body; a pointed snout; very large eyes; a protractile upper jaw; teeth in jaws villiform; the opercle and subopercle with a strong, simple spine each; gill opening wide; lateral line present, grooved; two dorsal fins, the first with three spines, the second with 12–14 unbranched rays (the last divided at its base); anal fin with 12–13 branched rays (the last divided at its base), pectoral fins large, rounded; pelvic fins with one spine and five rays; caudal fin rounded. The Draconettidae are distinguished from the similar Callionymidae by the lack of a preopercular spine, but the presence of an opercular and subopercular spine, the wide gill opening (restricted to a small pore in callionymids), and the

grooved lateral line (covered by skin in callionymids, with small pores).

The family was first revised by Briggs and Berry (1959), who considered only a single genus as valid, and then by Nakabo (1982) who treated two genera and seven species. The most recent revision of Fricke (1992) included 11 valid species in two genera, *Centrodraco* Regan 1913 and *Draconetta* Jordan & Fowler, 1903. Fricke (2002a) described *Centrodraco abstractum* from the Philippines. The checklist of Fricke (2002b) therefore included 12 valid species of the family. Subsequently, *C. atrifilum* was described from eastern Australia (Fricke, 2010).

The genus *Centrodraco* is characterised within the family Draconettidae by stout and pungent spines in the first dorsal fin (versus long and slender spines in *Draconetta*), 14 (13–15) soft rays in the second dorsal fin (versus 12 rays), and 13 (12–14) soft rays in the anal fin (versus 12 rays), the lateral line disconnected (versus single, running to caudal peduncle), and supratemporal lateral line canal absent (versus present) (Fricke, 1992: 169–170).

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Three draconettid specimens trawled from the southern Loyalty Rise, New Caledonia turned out to be an undescribed species of *Centrodraco*. They are described and illustrated in the present paper.

## MATERIALS AND METHODS

The type series was collected during the oceanographic cruise EXBODI, principal investigators Sarah Samadi and Laure Corbari, supported by the UMS Flotte océanographique française.

Methods follow Fricke (1992); fin-ray counts follow Fricke (1983). The classification follows Eschmeyer (2014). The starting point for length measurements is the mid of the upper lip. The predorsal (1) length is measured from the mid of the upper lip to the base of the first spine of the first dorsal fin; the predorsal (2) length correspondingly to the base of the first ray of the second dorsal fin. The last ray of the second dorsal and anal fins is always divided at its base; counts in the key include this divided ray as one. Data for the holotype are given first, followed by data for the paratype, in parentheses, if different. The following abbreviations are used in the text: A anal fin counts; C&S cleared and stained specimen; D1 counts of first dorsal fin; D2 counts of first dorsal fin; P1 pectoral fin counts; P2 pelvic fin counts; RV research vessel; SL standard length.

Species are classified based on Fricke (2002b); however, subspecies of *Centrodraco oregonus* are now raised to species level following the method of Fricke *et al.* (2009: 5). References and journals follow Fricke (2014) and Fricke and Eschmeyer (2014a); abbreviations of museum collections (see below) follow Fricke and Eschmeyer (2014b).

### Comparative material

*Centrodraco abstractum* Fricke, 2002: AMS I.36455-006 (holotype), I.36455-000 (1 paratype), CAS 88652 (1), 88664 (5); *C. acanthopoma* (Regan, 1904), BMNH 1896.2.10.33 (holotype), 1998.8.9.6454 (1), MCZ 27990 (1), 39535 (1), 39990 (1), 60853 (3 + 1 C&S), 85927-85935 (9), 96833 (2), 98729 (1), 128239 (1), 149175-149178 (4), MMF 22868 (1), 22542 (3), 22880 (1), SU 51107 (1), UBC 59308 (1), UF 109567 (3), 109575 (1), USNM 45752 (2), 46015 (1), 134187 (1), 156956 (11), 156957 (1), 156958 (1), 158753 (4), 198024 (11), 240691 (1), 240692 (1), 240693 (1), 240694 (1), 307803 (2), ZMB 14011 (1), ZMUC P.64164 (1); *C. atrifilum* Fricke, 2010, AMS I.24455-001 (holotype), I.27676-007 (1 paratype); *C. gegonipus* (Parin, 1982): IOAN uncat. (2 paratypes), uncat. (1 + 1 + 1); *C. insolitus* (McKay, 1971): BMNH 1997.9.17.36 (1), WAM P.19164-001 (holotype), P.19165-001 (1 paratype), P.19166-001 (1 paratype), P.25394-011 (1); *C. lineatus* Fricke, 1992: SMNS 12136 (1 paratype), ZISP 49940 (holotype), ZMMU 18680 (1 paratype); *C. nakaboi* Fricke, 1992: BSKU 29331 (1 paratype), ZISP 48693 (holotype), 48694 (5 paratypes); *C. ore-*

*gonus* (Briggs & Berry, 1959): MCZ 39991 (1 paratype), 40506 (1), 93488 (2), SU 50897 (4), 51106 (1 paratype), 68909 (1), UBC 58-307 (1 paratype), 58-307c (3), UF 5245 (3 paratypes), 203300 (3 paratypes), 204178 (6), USNM 158875 (28 paratypes), 159212 (2), 159234 (14), 159776 (holotype); *C. ornatus* (Fourmanoir & Rivaton, 1979): AMS I.19760-018 (1), HUMZ 75058 (holotype of *C. otohime* Nakabo & Yamamoto, 1980), 80237 (1 paratype of *C. otohime* Nakabo & Yamamoto, 1980), NTUM 10659 (1), SMNS 21797 (1), YPM 10040 (1); *C. pseudoxenicus* (Kamohara, 1952): BSKU 1891-1892 (2), 4435 (1); *C. rubellus* (Fricke, Chave & Suzumoto in Fricke, 1992): BPBM 28915 (holotype), SMNS 8525 (1 paratype); *C. striatus* (Parin, 1982): IOAN uncat. (2 paratypes), uncat. (3 + 2), ZISP 45724 (holotype of *Draconetta nana* Parin, 1982); *Draconetta xenica* Jordan & Fowler, 1903: NTUM 10649 (1), 10652 (1), SMNS 8549 (1), 21798 (1), SAIAB 165 (holotype of *Draconetta africana* Smith, 1963), USNM 51633 (holotype of *Draconetta hawaiiensis* Gilbert, 1905), 314593 (1), 314595 (3), ZUMT 54341-54346 (6).

### *Centrodraco fidelis* new species

(Figs 1-2)

#### Material

*Holotype*. - MNHN 2015-0141, male, 39.8 mm SL, New Caledonian EEZ, southern Loyalty Rise, Banc de l'Orne, 33 km north of Walpole Island, 22°17'S 169°01'E, 412-436 m depth, dredge, St. DW 3860, Wei-Jen Chen, RV *Alis*, 15 Sep. 2011.

*Paratypes*. - NTUM 10653, 1 male, 42.4 mm SL, New Caledonian EEZ, southern Loyalty Rise, Banc Durand, 77 km southeast of Maré Island, 22°03'S 168°42'E, 430-440 m depth, beam trawl, St. CP 3848, Wei-Jen Chen, RV *Alis*, 13 Sep. 2011; NTUM 10654, 1 male, 41.9 mm SL, same data as the holotype.

#### Diagnosis

A *Centrodraco* with 14 rays in the second dorsal fin, 13 rays in the anal fin, the first dorsal fin with the second spine elongate and filamentous in the male, the second dorsal fin very low, without filaments in the male, opercular spine in subopercular spine 1.8-2.4; body slightly compressed, body depth 7.4-8.5% of SL, body width 7.7-8.8% of SL; pectoral fin short, not reaching to anus when adpressed, pectoral fin length 9.9-11.8% of SL; the male body colour pattern pale, with a single grey spot on the beginning of the lower lateral line; filament in first dorsal fin pale, fin with a large basal dark blotch; the male anal fin with three dark blotches.

#### Description

D III + xiii,1; A 13; P1 i,25-26,i (total 27-28); P2 I,5; C (ii),ii,8,ii,(iii).

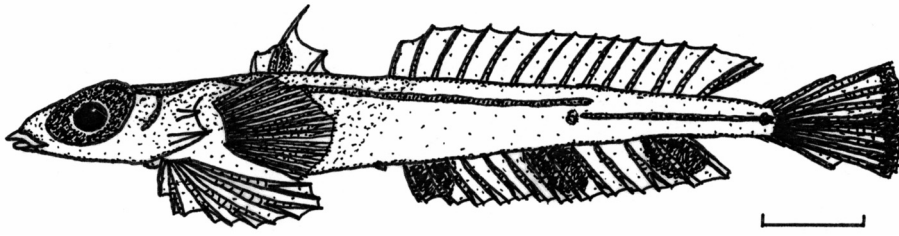


Figure 1. - *Centrodraco fidelis* new species, New Caledonian EEZ, southern Loyalty Rise, Banc de l'Orne, 412-436 m depth (holotype, MNHN 2015-0141). Drawing of lateral view, left side. Scale bar = 5 mm.



Figure 2. - *Centrodraco fidelis* new species, New Caledonian EEZ, southern Loyalty Rise, Banc de l'Orne, 412-436 m depth (paratype, NTUM 10654). Photograph: W.-J. Chen.

Body elongate and slightly compressed. Head slightly compressed, head length 264 (260-283). Eye diameter 116 (113-129). Preorbital length 30 (28-29). Interorbital distance 6 (8-9). Upper jaw length 55 (61-64). Opercle and subopercle with a strong retrorse spine each, opercular spine 1.8 (2.1-2.4) in subopercular spine. Occipital region smooth. Body depth 118 (123-136). Body width 113 (120-129). Urogenital papilla length 4 (2-4) in the male. Caudal peduncle length 143 (97-129). Caudal peduncle depth 38 (47-48).

First dorsal fin relatively low in male, but second spine bearing a filament; length of 1<sup>st</sup> spine 26 (34), 2<sup>nd</sup> spine 85 (84), 3<sup>rd</sup> spine 25 (28). Predorsal (1) length 304 (290-343). Second dorsal fin very low, distally straight. Second dorsal fin rays unbranched, the last divided at base. First ray of second dorsal fin 45 (52), last ray 65 (71-74). Predorsal (2) length 487 (499-516) in SL. Anal fin beginning on vertical through 1st (1st to 2nd) membrane of second dorsal fin. Anal fin rays branched, last unbranched but divided at base. First ray of anal fin 53 (54), last ray 65 (66-84). Preanal fin length 512 (520-535). Pectoral fin short, not reaching to anus but only to level of end of second dorsal fin when adpressed, pectoral fin length 118 (99). Prepectoral fin length 269 (288-308). Pelvic fin spine 38 (38-42), pelvic fin length 219 (212-220). Prepelvic fin length 173 (205-224). Caudal fin truncate; caudal fin length 161 (160-174).

Colour immediately after collection (see Fig. 2). Head and body silver, with rose and dark rose blotches bearing small brown pigment spots. Dorsal parts of eye greenish silver, central and lower parts yellowish. Belly silvery white, with few brown pigment spots. First dorsal fin reddish. Anal fin pale, with three large dark blotches. Central part of caudal fin dark.

Colour in preservative (see Fig. 1). Head and body pale whitish, with a small grey spot on the beginning of the second lateral line. Eye dark grey. First dorsal fin pale, with a basal dark blotch. Second dorsal fin translucent. Anal fin pale, with three large dark blotches, the first on the first to

third membranes, the second on the seventh to eighth membranes, the third on the 12<sup>th</sup>-13<sup>th</sup> membranes.

Sexual dimorphism. Unknown; only male specimens known.

#### Distribution

The type specimens were dredged/trawled on the southern Loyalty Ridge in the New Caledonian EEZ, southwestern Pacific Ocean (Fig. 3). The holotype and one paratype originate from the Banc de l'Orne, north of Walpole Island, another paratype from the Banc Durand, southeast of Maré Island. The species is probably endemic to the Loyalty Ridge. It is known from depths of 412-440 m.

#### Habitat

The paratype from the Banc Durand was dredged from a sand bottom, together with the lophiid *Lophiomus setigerus* (Vahl, 1797), the cynoglossid *Paraplagusia* sp., and the hoplichthyid *Hoplichthys citrinus* Gilbert, 1905. Other families collected in the paratype station (CP 3848) included Bembridae, Champsodontidae, Chaunacidae, Gobiesocidae, Myctophidae, Macrouridae and Ogocephalidae. At the station DW3860, the holotype and paratype of *Centrodraco fidelis* n. sp. were the only fish specimens collected. Species of *Centrodraco* usually occur on patches of soft substrate on slopes or seamounts. As this habitat is scarce and difficult to sample, specimens are extremely rare in collections, and probably also biologically rare.

#### Etymology

*Fidelis* (Latin) means loyal. The name refers to the type locality on the southern Loyalty Ridge.

#### Comparison

The new species closely resembles *Centrodraco atri-flum* Fricke, 2010; the species are distinguished within the genus *Centrodraco* by their low second dorsal fin without filaments, the first spine of the first dorsal fin which is much

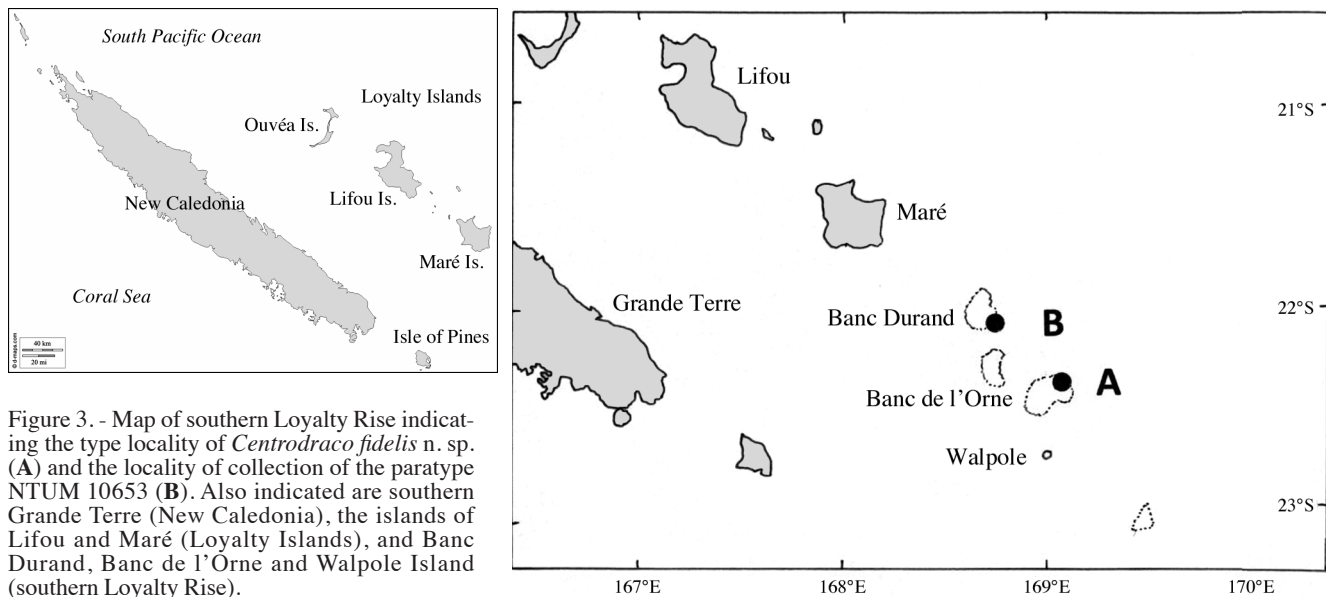


Figure 3. - Map of southern Loyalty Rise indicating the type locality of *Centrodraco fidelis* n. sp. (A) and the locality of collection of the paratype NTUM 10653 (B). Also indicated are southern Grande Terre (New Caledonia), the islands of Lifou and Maré (Loyalty Islands), and Banc Durand, Banc de l'Orne and Walpole Island (southern Loyalty Rise).

shorter than the second spine, and the filament on the second spine of that fin. *Centrodraco fidelis* n. sp. differs from *C. atrifilum* in the pale filament (red in life) in the first dorsal fin (versus black in *C. atrifilum*), the first dorsal fin pale (red in life), with a large basal black blotch on the second spine (versus pale, without a blotch), the anal fin with three large dark blotches in male (versus pale, without blotches), the opercular spine 1.8-2.4 in subopercular spine (versus 1.4-1.8), the slightly compressed body, with the body depth 7.4-8.5% of SL, body width 7.7-8.8% of SL (versus depressed, body depth 9.2-10.6% of SL, body width 10.9-17.5% of SL), and the short pectoral fin, not reaching anus when adpressed, pectoral fin length 9.9-11.8% of SL (versus moderately large, reaching anus when adpressed, pectoral fin length 17.9-20.8% of SL). Several additional proportions differ as well. The species may be identified within the family Draconettidae with the revised key to the species of that family, which is presented below.

## DISCUSSION

Besides *Draconetta xenica* Jordan & Fowler, 1903 and *Centrodraco ornatus* (Fourmanoir & Rivaton, 1979), this is the third draconettid species found in New Caledonian waters. A total of 15 species is now known in the family, and 20% of these inhabit New Caledonia. At Durand Seamount, the new species occurs sympatric with *C. ornatus*. This resembles the situation at the Kyushu-Palau Ridge, where two species of *Centrodraco* occur sympatrically (*C. rubellus* and *C. nakaboi*).

The known depth distribution of *Centrodraco fidelis* n. sp. (412-440 m) well corresponds with that of other species

in the genus, which is only found on soft bottoms of continental slopes or on submarine ridges and seamounts, at depths of 210-640 m (Fricke 1992, 2002a, 2002b, 2010). The following depth ranges are known for the other species in the genus: *C. abstractum* (376-382 m), *C. acanthopoma* (300-594 m), *C. atrifilum* (318-640 m), *C. gegonipus* (290-420 m), *C. insolitus* (350 m), *C. lineatus* (264-415 m), *C. nakaboi* (345-600 m), *C. oregonus* (229-411 m), *C. ornatus* (300-530 m), *C. pseudoxenicus* (210 m), *C. rubellus* (280-363 m), *C. striatus* (225-340 m).

The distribution of fishes on islands and ridges in the southwestern Pacific was analysed by Fricke *et al.* (2011). They reported a total of 2328 species from New Caledonia, including 1029 fish species from the Loyalty Ridge including the Loyalty Islands. The EXBODI cruise provided several additional records and undescribed species, which will be subject of forthcoming publications.

The close relationship of the new species to the eastern Australian *Centrodraco atrifilum* underlines a zoogeographical affinity between Australia and New Caledonia which was found in other fish groups (e.g. Tripterygiidae; see Fricke, 1994, 1997); Fricke (1997: 47) discussed a generalised dispersal track from northern Australia to the southwestern Pacific islands via New Caledonia. He explained these patterns with the plate tectonic origin of the New Caledonian Plate, which separated from the Australian Plate 67 million years ago (Ma), while the Loyalty Islands Ridge separated from New Caledonia at 17 Ma (Fricke, 1997: 49-50). These plates/ridges were isolated soon thereafter; as all ridges in the region run in north-south direction, fish faunas moved north and south during warming and cooling events in the Pleistocene, but usually did not disperse in west-east direction towards the next ridge. The Loyalty Ridge seems suffi-



ciently isolated for the past 17 Ma to support locally endemic species. Other species endemic to the Loyalty Ridge/Loyalty Islands include *Etmopterus caudistigmus* Last, Burgess & Séret, 2002 (Etmopteridae), *Bathycongrus unimaculatus* Karmovskaya, 2009 (Congridae), *Coelorinchus shcherbachevi* Iwamoto & Merrett, 1997 (Macrouridae), *Parasciadonus pauciradiatus* Nielsen, 1997 (Aphyonidae), *Luzonichthys williamsi* Randall & McCosker, 1992 (Serranidae), *Protogrammus antipodus* Fricke, 2006 (Callionymidae). Together with the new draconettid species, the endemic element of the Loyalty Ridge therefore adds to seven species. With an increasing research effort in the region, more are expected to be discovered.

### KEY TO GENERA AND SPECIES OF DRACONETTIDAE

1a. First dorsal fin spines long and slender; second dorsal fin rays 12; anal fin rays 12; Indo-West Pacific . . . *Draconetta*; only one species: *Draconetta xenica* Jordan & Fowler, 1903  
1b. First dorsal fin spines stout and pungent; second dorsal fin rays 14 (rarely 12-15); anal fin rays 13 (-14) . . . . .  
. . . . . *Centrodraco*, 2  
2a. Second dorsal fin rays with long filaments . . . . . 3  
2b. Second dorsal fin rays without filaments (rarely with very short filaments) . . . . . 9  
3a. First dorsal fin plain black; 1<sup>st</sup> spine of first dorsal fin shorter than 2<sup>nd</sup> spine, not filamentous; body with dark vertical lines; southeastern Pacific . . . . .  
. . . . . *Centrodraco striatus* (Parin, 1982) (male)  
3b. First dorsal fin light, may be distally dark; 1<sup>st</sup> D1 spine longer than 2<sup>nd</sup> spine, filamentous; body not with dark vertical lines (may bear dark horizontal lines or dark blotches) . . . . . 4  
4a. Body with 2-3 long horizontal dark streaks . . . . . 5  
4b. Body without long horizontal dark streaks (may have dark spots or blotches or short ocellated dark streaks) . . . . 6  
5a. Each anal fin membrane with a dark blotch; second dorsal fin membranes each with a vertical dark line, distally dark; first D1 spine 147 or less per mill of SL (in specimens with more than 70 mm SL); first ray of second dorsal fin less than 200 per mill of SL (in specimens with more than 70 mm SL); western Indian Ocean . . . . .  
. . . . . *Centrodraco lineatus* Fricke, 1992 (male)  
5b. Anal fin light, without dark blotches; second dorsal fin membranes without vertical dark lines, distally dark; first spine of first dorsal fin 148 or more per mill of SL (in specimens with more than 70 mm SL); first ray of second dorsal fin more than 230 (in specimens with more than 70 mm SL);

Central Atlantic Ocean . . . . .  
. . . . . *Centrodraco oregonus* (Briggs & Berry, 1959) (male)  
6a. Body with short ocellate lines and blotches; each A membrane with a dark spot; West Pacific . . . . .  
. . . . . *Centrodraco ornatus* (Fourmanoir & Rivaton, 1979) (male)  
6b. Body not with ocellate lines and blotches (may have small spots); anal fin plain white . . . . . 7  
7a. Body densely covered with dark spots; Japan and China . . . . . *Centrodraco pseudoxenicus* (Kamohara, 1952) (male)  
7b. Body plain whitish or brown; if bearing spots, not densely covered, but spots in two distinct groups; southeastern Pacific or Australia . . . . . 8  
8a. Second dorsal fin membranes with vertical dark lines, distally dark; caudal fin base without a dark blotch; off northwestern Australia . . . . .  
. . . . . *Centrodraco insolitus* (McKay, 1971) (male)  
8b. Second dorsal fin membranes plain whitish, without vertical lines, may be distally dark; caudal fin base with a dark brown blotch; southeastern Pacific . . . . .  
. . . . . *Centrodraco gegonipus* (Parin, 1982) (male)  
9a. First spine of first dorsal fin shorter than second spine . . . . . 10  
9b. First spine of first dorsal fin longer than second spine . . . . . 20  
10a. First spine of first dorsal fin more than 1.7 in second spine; second spine with a filament in male; eastern Australia . . . . . 11  
10b. First spine of first dorsal fin less than 1.7 in second spine; second spine without a filament . . . . . 12  
11a. Filament in first dorsal fin black, fin basally pale in male; anal fin pale; opercular spine in subopercular spine 1.4-1.8; body depressed, body depth 9.2-10.6% of SL, body width 10.9-17.5% of SL; pectoral fin moderate, reaching to anus when adpressed, pectoral fin length 17.9-20.8% of SL; eastern Australia . . . . . *Centrodraco atrifilum* Fricke, 2010  
11b. Filament in first dorsal fin pale, fin with a large basal dark blotch; anal fin with three large dark blotches, opercular spine in subopercular spine 1.8-2.4; body slightly compressed, body depth 7.4-8.5% of SL, body width 7.7-8.8% of SL; pectoral fin short, not reaching to anus when adpressed, pectoral fin length 9.9-11.8% of SL; southern Loyalty Ridge (New Caledonian EEZ) . . . . . *Centrodraco fidelis* n. sp.  
12a. First dorsal fin plain black . . . . . 13  
12b. First dorsal fin not plain black (may be distally dark) . . . . . 14  
13a. Body with about 11 regular vertical dark streaks; anal fin with distal dark spots; southeastern Pacific . . . . .  
. . . . . *Centrodraco striatus* (Parin, 1982) (female)  
13b. Body with irregular dark spots and blotches, not with regular vertical dark streaks; anal fin plain white; Hawaiian Islands to Indonesia . . . . .

- ..... *Centrodraco rubellus* Fricke, Chave & Suzumoto in Fricke, 1992 (female)
- 14a. Body with 2-3 long horizontal dark lines ..... 15
- 14b. Body with irregular dark blotches, without horizontal dark lines ..... 16
- 15a. Each anal fin membrane with a dark blotch; second dorsal fin membranes each with a vertical dark line; western Indian Ocean . . . *Centrodraco lineatus* Fricke, 1992 (female)
- 15b. Anal fin light, without dark blotches; second dorsal fin without vertical dark lines; Central Atlantic Ocean ..... . . . . *Centrodraco oregonus* (Briggs & Berry, 1959) (female)
- 16a. Anal fin distally blackish; caudal fin distally blackish; Pacific Ocean. .... . *Centrodraco nakaboi* Fricke, 1992 (male)
- 16b. Anal fin whitish, without any dark markings; caudal fin whitish, without any dark markings ..... 17
- 17a. Second dorsal fin distally dark. .... 18
- 17b. Second dorsal fin whitish, without any dark markings; Atlantic Ocean. .... . *Centrodraco acanthopoma* (Regan, 1904) (female)
- 18a. First dorsal fin distally dark ..... 19
- 18b. First dorsal fin whitish, without any dark markings; Pacific Ocean. .... . *Centrodraco nakaboi* Fricke, 1992 (female)
- 19a. Caudal fin plain whitish, occasionally with a basal dark blotch; Atlantic Ocean. .... . *Centrodraco acanthopoma* (Regan, 1904) (male)
- 19b. Caudal fin with a distal dark stripe and with a basal dark blotch; Pacific Ocean. .... . *Centrodraco nakaboi* Fricke, 1992 (male)
- 20a. First spine of first dorsal fin bearing a filament; upper third of caudal fin with a long dark streak reaching distal half of fin; Hawaiian Islands and Indonesia ..... . *Centrodraco rubellus* Fricke, Chave & Suzumoto in Fricke 1992 (male)
- 20b. First spine of first dorsal fin not filamentous; upper part of caudal fin without a dark streak or with a short dark streak at most in proximal one-third of fin (caudal fin occasionally with a basal dark blotch) ..... 21
- 21a. Body densely covered with numerous round dark spots; Japan and China ..... . *Centrodraco pseudoxenicus* (Kamohara, 1952) (female)
- 21b. Body colouration not as described above; either plain brown or whitish, or with short longitudinal streaks in its dorsal part, or with groups of short transverse streaks, or with pale brown spots in two distinct groups ..... 22
- 22a. Body with short ocellate longitudinal streaks; West Pacific ..... . *Centrodraco ornatus* (Fourmanoir & Rivaton, 1979) (female)

- 22b. Body colouration not as described above; either plain brown or whitish, or with groups of short transverse streaks, or with pale brown spots in two distinct groups ..... 23
- 23a. Caudal fin pale, without any dark markings; body usually with pale brown spots in two distinct groups; off north-western Australia. .... . *Centrodraco insolitus* (McKay, 1971) (female)
- 23b. Caudal fin with a basal dark blotch; body plain brown or with groups of short longitudinal transverse streaks; Pacific ..... 24
- 24a. Body light, with a group of short transverse streaks under anterior half of second dorsal fin; dorsal part of caudal fin with a short dark streak; rays in distal half of second dorsal fin without filaments; Philippines ..... . *Centrodraco abstractum* Fricke, 2002
- 24b. Body plain brown; dorsal part of caudal fin pale; rays in distal half of second dorsal fin filamentous; southeastern Pacific ..... *Centrodraco gegonipus* (Parin, 1982) (female)

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